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THE DETECTION OF FORMALDEHYDE IN WITCH HAZEL.

By W. A. PUCKNER, Chicago.

"Witch-hazel extract," long used as a household remedy, has been admitted to the eighth decennial revision of the United States Pharmacopœia under the title Aqua Hamamelidis or Hamamelis Water. For the detection of formaldehyde in this preparation the following test is prescribed: If 1 c.c. of hamamelis water be added to 5 c.c. sulphuric acid containing a little salicylic acid in solution, no red color should appear (absence of formaldehyde).

While the reliability and sensitiveness of the many formaldehyde tests have been critically reviewed,[1] the above test does not seem to have been considered. Since witch hazel promises to be a favored subject for investigation by dairy commissioners and similar bodies entrusted with the enforcement of pure food and drug laws, the following experiments are of interest:

Dilutions of formaldehyde were prepared (*a*) containing 1 gramme of absolute formaldehyde in 1,000 c.c. of water; (*b*) containing 1 gramme formaldehyde in 1,000 c.c. of a liquid obtained by mixing 15 volumes of official alcohol and 85 volumes of water; (*c*) containing 1 gramme formaldehyde in 10,000 c.c. water; (*d*) containing 1 gramme formaldehyde in 10,000 c.c. of 15 per cent. alcohol; (*e*) 1 gramme in 100,000 c.c. water; (*f*) 1 gramme formaldehyde in 100,000 c.c. 15 per cent. alcohol.

(1) One gramme salicylic acid was dissolved in 100 c.c. sulphuric acid, sp. gr. 1·8341$\frac{1}{15}$°. Portions of 5 c.c. of the reagent were measured into dry tubes and 1 c.c. each of the formaldehyde dilutions just described added, mixed with the

[1] B. M. Pilhashy, *Jour. Am. Chem. Soc.*, 1890, 22, 132. C. H. LaWall, *Am. Drug.*, 1905, 47, 33. U. S. Dept. Agriculture, Division of Chemistry, Bull. 90, 45.

reagent by rotation and the color observed after five minutes. In no case was a red coloration observed. When a 1 per cent. formaldehyde solution was tested a decided red color developed.

(2) The reagent was prepared by dissolving 0·1 gramme salicylic acid in 100 c.c. sulphuric acid. The formaldehyde dilutions were tested as in 1, with these results:

(*a*) 1 in 1,000 water. Deep red color.

(*b*) 1 in 1,000 15 per cent. alcohol. Deep red color.

(*c*) 1 in 10,000 water. Rose color, much lighter than *a*.

(*d*) 1 in 10,000 15 per cent. alcohol. Distinct rose color, much less than *c*.

(*e*) and (*f*) No red coloration.

(3) The reagent was prepared by dissolving 0·01 gramme salicylic acid in 100 c.c. sulphuric acid. The formaldehyde dilution tested as in 1 showed:

(*a*) 1 in 1,000 water. Color was deep red, somewhat less intense than 2 *a*.

(*b*) 1 in 1,000 15 per cent. alcohol. Color deep red, less intense than 3 *a*.

(*c*) 1 in 10,000 water. Color rose red, deeper than 2 *c* and nearly equal to 3 *b*.

(*d*) 1 in 10,000 15 per cent. alcohol. Color more pronounced than 2 *c*.

(*e*) and (*f*) No red coloration.

(4) When the reagent was prepared by dissolving 0·001 gramme salicylic acid in 100 cc. sulphuric acid, very faint traces of reddish color developed with solutions *a* and *c* only.

(5) The reagent was prepared by dissolving 0·01 gramme salicylic acid in 100 c.c. of a weaker sulphuric acid, having a specific gravity of 1 8090 at 25/25 degrees. Tested as before, after five minutes the colors were:

(*a*) 1 in 1,000 water. Red color distinct, but much less intense than 3 *a*.

(*b*) 1 in 1,000 15 per cent. alcohol Red color, less intense than 3 *a*.

(*c*) 1 in 10,000 water. Red color, less intense than 5 *b*.

(*d*) 1 in 10,000 15 per cent. alcohol. Red tinge hardly perceptible.

At the end of an hour these colors all became more intense and after several hours closely approached those obtained in 3.

(6) To portions of 5 c.c. of the reagent, prepared as at 3, was added 0·6 c.c., 0·8 c.c., 1 c.c., 1·2 c.c., 1·4 c.c.., 1·6 c.c., 1·8 c.c., 2 c.c. of the dilution *c*, containing 1 of formaldehyde in 10,000 water. The intensity of the color increased with the added quantity of formaldehyde dilution up to 1·4 c.c. and then remained constant.

The dilution *d*, containing 1 in 10,000 15 per cent. alcohol, when used in the same way gave similar results. When 0·6 c.c. was used the red was barely perceptible; the intensity then increased until 1·4 c.c. were added, and then again remained the same when still larger volumes of the formaldehyde dilution were used.

(7) The reagent prepared as at 3 and allowed to stand over night, eighteen hours, was found to be inert, *i. e.*, did not show the presence of formaldehyde in any of the dilutions used above.

These experiments show that the official formaldehyde test, when properly applied, will show the presence of 1 gm. of formaldehyde in 10,000 c.c. of a 15 per cent. alcohol.

The relative sensitiveness of the test was shown by the following experiment: A commercial specimen of witch hazel, which from the color yielded with the official test, was judged to contain about 1 part formaldehyde in 5,000 parts, was diluted with 9 times its volume of water, and a distinct, if not deep, purple coloration when applying the Leach hydrochloric acid-casein test[1] which, in my hands, has been sensitive to 1 in 100,000, was obtained.

When much salicylic acid is used the test is less sensitive: if 0·05 gramme is used for 5 c.c. sulphuric acid, then it will fail to detect 1 part formaldehyde in 1,000 c.c. Further, the reagent should be freshly prepared and the sulphuric acid should be of full strength.

It would seem desirable that the official test be changed to read: "If 1 c.c. hamamelis water be added to 5 c.c. of a freshly prepared solution of 0·01 gramme salicylic acid in 100 c.c. sulphuric acid, no red color should appear on standing (absence of formaldehyde)."

PRELIMINARY REVIEW OF THE CHEMISTRY OF THE U.S.P., VIII.

By Carl G. Hinrichs, Ph.C.,
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The long-expected has happened—the Pharmacopœia is out. The many warnings sent to the journals of its expected arrival have kept the druggists on the lookout. Still, doctors of a certain stripe will cheerfully go along the old way of prescribing ready-made preparations, while the true physician will take heed of the changes that vitally concern him and his patients. The chemist turns to the chemicals, looks at the fine print and incidentally at the heralded modern features. The secretary of the commission already desires criticism, even at this early date! The editor of the A. J. P. is satisfied with a review of the new Eighth Decennial Revision of the United States Pharmacopœia. I shall try to please both, and especially the latter.

But, first, may we not commend the committee for its extreme modesty? Five years have they labored; 1900 is already a recol-

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[1] Bulletin No. 65, U. S. Dept. Agriculture, Dept. Chemistry, p. 108(b).

lection of the dim past; but the Eighth Decennial Revision can fit in any year very nicely. Five years the commission has waited to bring forth the work; could they not have waited five months from publication to make the work official? Germany's Pharmacopœial Commission was called together in January; in June the work was published; the following January it became obligatory. But Germany has a moderate-sized work; it is kept abreast of the times; it makes its appearance every five years.

The reason for this delay cannot be justly charged to the large amount of work done by the commission, as the book fails to reveal it. The system of general voting on every dot and every I by the whole committee has taken up the time. I cannot see the reason for the pharmacists passing on the chemical data, nor why they, whose profession is materia medica, should lose sleep over the smears of the druggists. The commission had excellent men representing every branch of pharmacy; why could they not have followed the modern method of division of labor. Imagine some of the druggists worrying over that ancient theory of artiads and perissads when the question of $FeCl_3$ or Fe_2Cl_6 was gravely discussed; 'tis sad! It is my belief that the work would have been better and more prompt in its appearance, if a plan, as intimated above, had been followed.

As to changes in nomenclature, the committee was conservative; they believe in *one* English language. In this we should commend them. We have tried to learn the mother tongue; to be compelled to do this work over again would cause much worry. How this so-called American-English can be a matter of discussion, after the flaying it has received in the *Chemical News* about a decade ago, I fail to see. One English language is enough for us.

In the preface p. xl it says: "The dropping of the final e for the alkaloids and the halogens was not approved for the reason that its use has become a thoroughly established custom in this country, and it was *not deemed wise or safe* to sacrifice this distinctive method of designating powerful substances used as medicine." With this excellent premise, we ask, was it *wise or safe* to even change the "unchangeable" Latin titles. The "use has become thoroughly established" to call arsenous acid acidum arsenosum; indeed, it varies little from this in other pharmacopœias, -icosum and -iosum, in French it is given in the vernacular. This poison will probably

never change its name in the vernacular. Is arsenic trioxide "thoroughly established" in chemistry? We say no; it is a theoretical name. That it contains arsenic and oxygen none will doubt; that these are present in a certain definite proportion is unquestioned, but the formula is to-day in question; new German works are prone to call this arsenic hexoxide, next revision may be modern, and want the term arseni hexoxidum. The danger that may arise from too many theorists composing a *practical* work cannot be better shown than by the above.

Changing of names is a curse; not only is chemistry blessed with this curse, but other sciences also. Botany is in a bad way. Botanists have ruled unanimously to go back to the oldest name; a tacit acknowledgment by these scientists that they do not recognize manufacture of names for named things as botanical expertness, or a grand advancement in botany. The botanists do not look upon this with favor, as the great herbaria and museums have directors whose clerks are expert clerks as a rule, and they can do the heavy scientific work of bringing forth new names, you can imagine the chaos the science already was fast approaching.

In chemistry we speak of carbon dioxide to-day; its predecessor was carbonic anhydride and carbonic acid anhydride; even before this it was known as carbonic acid. While these anhydride terms have passed into innocuous desuetude, the older term, carbonic acid, thrives in common life. To give a named substance a new name every time a little additional insignificant new fact has been noted, is not sane practice. This habit can never be endorsed by those who follow. Even to-day it is sufficiently difficult to read books of Liebig's time. Probably these word-changers have never seen a work antedating their youth, nor had occasion to look up the prior art of a chemical manufacture, or, if they should try to read up in an old book and not understand the language, they would say, "Oh, that is antiquated."

The committee has followed in the wake of the British, Germans and French in introducing synthetics. While at the time when the other pharmacopœias admitted these products, it might have been considered a questionable procedure, to-day it would be folly to refuse these agencies a place in the U.S.P. They have proved their value medicinally, even if they were encumbered with exorbitant prices and clinical reports "made in Germany."

An attempt has been made to convey the chemical nature of the substance in the official title. This is very good so far as it goes; still, catchy and euphonious titles can not as a rule result therefrom. It seems the patentees have carefully considered the name for their products; the extensive advertising has made these names familiar. The phenacetinum of other pharmacopœias finds itself replaced by acetphenetidinum in the U.S.P. Where in the Pharmacopœia will we find the synonym phenacetin? It is going a trifle too far to ignore this name in the work, even if the Farbenfabriken have a trade-mark on phenacetin in the United States. This cannot prevent people from using that term; the B.P. gets around such nice points by saying, under the title Phenazonum, as foot-note: "Phenazone is commonly known as antipyrine." Probably the many prosecutions under the name phenacetin has made the term unpopular in the United States. The exorbitant prices on these products and the unjustness of our patent laws in this regard, causing the druggist to be easily roped in, makes it a good policy to admit such drugs to the U.S.P. as soon as possible. This will prevent substitutions practiced on the druggist, for the U.S.P. contains the tests whereby he can identify the product. This will also protect the patient from inferior drugs, our most important duty.

From old Roger Bacon till to-day is a long cry; his spirit has just been made official. Acetone is an excellent solvent for organic as well as inorganic compounds, especially mercuric salts. It is a good addition to the U.S.P.

CHEMICAL FORMULÆ.

A few substances of the 1890 Pharmacopœia have suddenly found their weight reduced by half. Such are the ferric series, calomel series of salts, etc. Cerii oxalas is even bereft of its formula, this blunder of the former commission being remedied. I am pleased to see that formulation effusions of certain quasi chemists have not been admitted. I refer to the periodical attempt of some pharmacists to formulate the scale compounds. Some claim they cannot think chemically unless the substance is formulated. I have seen them place the chemical formula on bottles of crude salts; wonderful erudition.

The innovation in the U.S.P., VIII, is the introduction of structural formulæ in the definition. The chemicals of the U.S.P. are in all

cases far from C.P., to give their composition by molecular formulæ is sufficient, to attempt their structuralization is going a step beyond safe and sound reason. These formulæ are of interest to theoretical and working chemists; the molecular formula tells all that is required by the analytical chemist. The druggist of to-day is not even the latter, much less a theoretical chemist; hence this innovation is hardly called for.

Such formulæ may have their proper place in the great reference work of the druggist, the U. S. Dispensatory; they are matters for a reference work, and not the working guide. The German Arzneibuch has not a single chemical formula from the front cover to the back. The B.P. has one or two, but these are of the complex aromatics used as reagents. The Codex contains both the molecular and equivalent formulæ. As all volumetric assays are really based on the latter, their admission is correct.

The many complex bodies, the alkaloids, etc., have not been in all cases sufficiently studied to enable chemists to give their structure. This has led the commission to make the queer break of formulating alkaloidal salts, the acid structural, the alkaloid molecular. This is not in accordance with good chemical usage. Again, setting out the methyl group in codeine can but bewilder. Probably it feels its queer position!

GASOMETRIC ANALYSIS.

The commission has made the same blunders as its predecessor on this most elegant, rapid and exact method of analysis. The gas burette, nitrometer, used, is not the best, cheapest or most practical style for the druggist or chemist.

One table of corrections has been added. It is pleasing to see some advance made over the 1890, which implied barometric pressure has no noticeable effect on the gas volume. The U.S.P., VIII, says that pressure has some effect, but only when "the locality is more than 250 metres above sea level." The revisors have forgotten that all the estimations take place in the presence of water, and that the gas, as a result, is saturated therewith. At 15° the vapor tension of this watery vapor amounts to only 12·7 mm.; at 25° to 23·6 mm., and at 30° to *only* 31·6 mm., which amounts must be subtracted from the observed barometric pressure to give the *true gas pressure.* When we have this correct pressure we may proceed to apply the

table of the U.S.P., VIII. In other words, we have here the rich idea of some one to apply a correction to a method of analysis and still remain incorrect to the extent of from 1·5 to 3 per cent., and even more in summer. If it take five years to make a fake correction, how long will it take to complete it? Have your chemical subdivision, and do not let non-workers pass on technical questions of which they know little and understand less.

Let us consider that 250-metre absurdity. You will have to go rather high to touch this *low mark* in the city of New York. Observations as recorded by Professor Cole show that the mean barometric readings for a number of years in New York are 29·854 inches, practically 760 mm., equal no correction U.S.P., VIII. He has found that the hourly variations in pressure, if plotted for the year, follow the curve of probability, proving this barometric change follows the law of probability. In other words, he is able to calculate the number of times a certain reading will be made during the year. To avoid the negative sign, the deviations from 28·00 inches are given, I take only the ¼-inch differences to avoid too long a table. This is taken from the *Meteorologische Zeitschrift*, 1894, in our library:

Deviation	0·95	1·25	1·50	1·75	2·00	2·25	2·50
Times read	0	5	31	79	64	18	2

This table then demands that a pressure of 28·75 occur 79 times during a year. Let us take the readings of a single year as observed, 1890:

Reading	0·95	1·25	1·50	1·75	2·00	2·25	2·50
Observed	1	6	25	79	62	14	2

From the above, you will see that 760 mm. is not the prevalent thing even at sea level; in the West the changes are greater and more sudden. This variation from 28·95 to 30·50 inches in New York, means on 30 inches a variation of 5·1 per cent. Shall a small 5 per cent. be overlooked in our assays? But the overlooked or unheard-of vapor tension makes another inch at 25°, and this must always be subtracted from the barometric reading, one on thirty is another little 3⅓ per cent. Fine 8 per cent. was what the U.S.P. of 1890 allowed us to run on, and the grand U.S.P., VIII, allows New Yorkers the same. How considerate to our druggist in the metropolis. Did he have a "pull"?

Let us see the number of times the New Yorker gets a true result of analysis. The mean pressure is 29·854 (29·92 is 760 mm. or no correction), plus one inch is 30·854. So when the barometer stands at 30·854, vapor tension is compensated, and as you are not above 250 metres, you must ignore the barometer! Please take note of the fact that the highest reading for New York observed is 30·60, and that during the entire year 30·50 occurs only *twice*. Therefore, brother pharmacists, you will always have wrong results in the assay of spirits of nitre; your assays will always be *high*, from a per cent. to 8 per cent. *only*. One consolation to you, we are worse off in St. Louis, even the cyclone blew us way below any reading you may have in New York. For further details on this method of analysis, see "Hinrichs' General Chemistry," pages 228–231.

ATOMIC WEIGHT.

These are probably the most important data in chemistry; naturally they are then subject of continual research. It will be remembered that this research gave us a number of new elements of the argon variety. Lord Raleigh, in comparing the density of chemical nitrogen and that supposed to be purest nitrogen obtained from the air, found the latter to be relatively heavier than the former. When you consider the thoroughness wherewith nitrogen from air has been studied during the past century, may we not ask the question: Has hydrogen been more thoroughly studied than nitrogen? Hydrogen being the lightest of all known gases, how will impurity affect its atomic weight? There is only one answer possible, and that is, it will make the atomic weight higher. As a matter of fact, the results seem to tend in all instances in that direction. In physical standards the material taken should be above suspicion. It is very unfortunate that the committee has adopted this hydrogen standard, especially as the International Atomic Weight Commission has this year dropped this foolishness for good. See *Bulletin Société Chimique de Paris* for January, 1905.

In the future only one table of atomic weights will be published, namely, that referred to oxygen equal 16 000. This has been used by the men who practiced for years; bodies such as the Hungarian Association for the Advancement of Science have long discarded the silly hydrogen didactic twaddle. Practical German pharmacists, such as Fischer of Breslau, have used these same weights in their

many publications of practical value. It seems this set of U.S.P. weights had its inception from the Government chemist, Prof. F. W. Clarke. (See preface, p. xlvi.) Did he dupe the committee, or did the silly didactic nonsense appeal to the didactic druggists on the commission? Again, we must say that the chemists should not be hampered by others on the commission. Those who read only drug journals or the A. Ph. A. year-book cannot be said to be posted on current chemical literature.

In 1900 and 1901 there appeared a series of articles bearing on this subject in the *National Druggist*, that brought out a letter from the professor just mentioned. In this letter the Government chemist desires the committee to remember that, of 143 chemical teachers in German universities, 118 favored the hydrogen standard, 20 favored the oxygen standard, and 5 were indifferent. From the above, we see who was the nigger in the wood-pile. Four years only have elapsed since the said effusion. To-day the International Commission desires the oxygen standard only. They dropped hydrogen for the future. Why? Because a little understanding is gradually percolating into their respective heads. It may also be noted that the very prominent chemist, M. Guye, has lately proved the Stas value for nitrogen false, though declared by Stas as correct and sworn to by Prof. F. W. Clarke, for he is a great Stasian. When the foundation stones of the Government atomic weights are proven false, those based thereon are false; but, worst of all, analyses in which such values are used are also far from the truth. Of course, when this is brought out in criminal proceedings in the courts, judges will take note of the facts, and rule against the U.S.P. weights. I have found the dicta of official chemists are not blindly followed by the wideawake jurists in American courts.

I may be pardoned for expressing some satisfaction over the turn that has occurred during the past few years on atomic weights, especially as the first questioning of the Stasian system some fifteen years ago in the Academy of Sciences of Paris by my father has borne fruit. It then almost amounted to sacrilege to question the work of Stas. To-day it is gradually being admitted that there was a great deal of humbug in the work of this scientist. Will the United States Government chemists blindly follow the old lead, when all the world refuses to be further duped? We know not, but this is certain, independent chemists care little for Government work in this country; reason will prevail.

OFFICIAL DEFINITION.

This important feature of the U.S.P. is a vast improvement over the preceding edition—for chemicals at least. The 1890 said: "Sodium nitrate should be kept in well-stoppered bottles." The U.S.P., VIII, says: "It should contain not less than 99 per cent. of pure sodium nitrate (NO_2ONa), and should be kept in well-stoppered bottles." That old bottle of the 1890 was truly a queer vagary; at first sight that was the all-important thing for the druggist. The fine print was an incidental, thrown in for good measure and not important. Maybe this feature has had something to do with the apathy of the druggist to test his products. What is worth printing in a work of this kind is worth printing in such a manner as to be easily legible.

A very peculiar feature of the new edition is, it demands a strength which chemicals shall attain, but nowhere in the text can the method of verification be found. This is not noted in the above case only, but generally. In this instance there is not even an *implied* method of assay, as there is under sodii boras. Under the latter, deportment towards heat, it is stated: "At red heat the salt fuses to a glass and loses 47 per cent. in weight." There are too many of such instances in the U.S.P., VIII. In some cases the implied assay, for example under alumen, cannot be said to be in any way approaching accuracy.

The worst feature of the *implied assay* is that all the data given presuppose a strength of 100 per cent. They are based on the chemical formula and the "official" atomic weights. If the definition is correct the fine print data are wrong. If the fine print is correct, the definition is incorrect. The AMER. JOUR. PHARM. readers may choose either proposition.

The descriptions, as a rule, are to the point. Here and there an incorrect use of terms is made, however. For example, under potassium permanganate we are informed of a *blue metallic lustre.* This is the first time I learn that lustre has color.

Solubilities are given now at 25°. This makes a difference, as a rule, from the 1890 data of about 5 per cent. on amount dissolved.

The fusing and boiling points are similar to the old work. Of what use to the druggist is it to find that sodium nitrate fuses at 312° C.? Certainly he cannot verify this with any degree of satisfaction. The data of a pharmacopœia should be such as to admit of easy

confirmation and be of practical value. The above is neither. Under other salts we find temperatures given at which fusion takes place up to 700°. Certainly such data belong to a text book or reference book, such as the U.S.D., and not to a pharmacopœia.

The tests for purity and identity are given in the verbose style of the former edition. The statements are too involved for the chemist and hardly explicit enough for the druggist. Here the commission could have well followed the *British Idea*, plain and few tests, but tests of practical value. Lastly, the official tests as made could have been grouped together in the back of the book (see the B.P.). Is not the overwhelming appearance of the fine print frightening the average druggist from attempting a chemical test? If he knew the simplicity of the practice he would not be so apathetic. In a second paper I shall take up the testing of the Pharmacopœia in detail, touching on the directions for manipulation, tests of faulty nature and some important data that have been omitted.

THE TABLES.

First Atomic Weights Table. It appears an attempt is made to throw dust. The "International" for 1904 gave both H equal 1·000 and O equal 16·000. In 1905 both were given, but no hydrogen standard will be issued in 1906. So the U.S.P. will stand for years to come as a relic of the past.

Thermometric tables are as usual. I should be very much pleased to see a thermometer that can bite the ten thousandth of a degree. These tables could have been very much contracted if they had been made practical. There is no use going beyond that which can be detected with certainty. Chemists are happy if they get the tenth of a degree with certainty.

The specific gravity tables are sensible. The idea of taking specific gravity at 15° and referring that to water of 4° was very pharmaceutical, to say nothing of reducing the results to vacuo. The U.S.P., VIII, has the gravity taken at 25°, we compare this with the weight of an equal bulk of water at the same temperature. This temperature corresponds more closely to our condition of living than does the old 15° of the Europeans. The normality introduced will prove practical for the determination of the strength of weak solutions of acids and alkalies, not, however, for the higher strengths above 10 per cent.

Of measures, may say the same as under thermometric equivalents. They were formed by dividing till tired. Where can I find a minim measure showing the ten thousandth of a minim?

A CRITICAL REVIEW OF THE INORGANIC CHEMISTRY OF THE NEW UNITED STATES PHARMACOPŒIA.

By Henry W. Schimpf.

Among the newly added articles of the Pharmacopœia there are nine which belong to the class of inorganic substances. These are: Acidum hydriodicum dilutum, Acidum hypophosphorosum, Kaolinum, Mangani hypophosphis, Sodii arsenas exsiccatus, Sodii carbonas monohydratus, Sodii phosphas exsiccatus, Talcum and Talcum purificatum. Besides these, there are seven metallic salts of organic acids: Ammonii salicylas, Bismuthi subgallas, Bismuthi subsalicylas, Sodii citras, Strontii salicylas, Zinci phenolsulphonas and Zinci stearas. Also the following preparations containing principally inorganic substances: Cataplasma kaolini, Liq. sodii phosphatis compositus, Magnesii sulphas effervescens, Sodii phosphas effervescens, Unguentum acidi borici, Unguentum hydrargyri dilutum, and Unguentum zinci stearatis.

Acidum Hydriodicum Dilutum, Diluted Hydriodic Acid (HI).—"A solution containing not less than 10 per cent. by weight of the absolute acid and about 90 per cent. of water." This preparation was official in the U.S.P., 1860, but was dismissed because of its unstable nature and the consequent difficulty experienced in preserving it. It decomposed readily on exposure, liberating iodine. In the present preparation the introduction of about 1 per cent. of potassium hypophosphite produces sufficient hypophosphorous acid to act as a preservative; this it does by reducing any iodine set free to hydriodic acid. The acid should be kept in small amber-colored glass-stoppered bottles. The method of preparing it is the same as that recommended in the U.S.P., 1890, for Syrupus acidi hydriodici. The syrup is still official, but it is prepared from the dilute acid by the addition of syrup and water.

The preparation of the acid depends upon the reaction of potassium iodide in concentrated aqueous solution with a solution of tartaric acid in diluted alcohol. The mixed solutions are placed in

a bath of ice-water for several hours and then strained through cotton to separate the crystalline precipitate of potassium bitartrate. The reaction may be explained by the equation $KI + H_2C_4H_4O_6 = HI + KHC_4H_4O_6$. The use of alcohol and of the ice bath are to facilitate the separation of the potassium bitartrate.

In the Pharmacopœia of 1860, diluted hydriodic acid was made by passing hydrogen sulphide gas through iodine suspended in water. $2I_2 + H_2O + 2H_2S = 4HI + H_2O + S_2$. The product was a purer one than that of the present Pharmacopœia, but the use of sulphuretted hydrogen, because of its offensive odor, was decidedly objectionable.

The Pharmacopœia describes tests for the following impurities: Sulphuric acid, barium, non-volatile residue, heavy metals, by the "Time-limit Test;" and arsenic by "Modified Gutzeit's Test." To these might have been added tests for free iodine and tartrate.

The assay method recommended for the diluted acid, as well as for the syrup, is that employing Volhard's solution, as in the case of Syrupus ferri iodidi, in the 1890 U.S.P. This is an improvement over the former method for Syrupus acidi hydriodici, in which direct titration with decinormal silver nitrate v. s. was employed, and potassium chromate as the indicator.

Acidum Hypophosphorosum, Hypophosphorous Acid (HPH_2O_2).—Acidum hypophosphorosum and Acidum hypophosphorosum dilutum are both official, the former being newly added. It is "a liquid composed of 30 per cent. by weight of absolute hypophosphorous acid, $POH_2(OH)$, and 70 per cent. of water."

No method for the preparation of this acid is official, though the National Formulary gives a method for preparing the diluted acid. This may be concentrated by evaporation, but if heated to 130°—140° C., it decomposes, forming the spontaneously combustible hydrogen phosphide and other compounds. Hypophosphorous acid is a powerful reducing agent, reducing silver nitrate to metallic silver, mercuric chloride to mercurous chloride and finally to metallic mercury. It also precipitates yellow copper hydride when heated with copper sulphate.

Tests for the detection of the following possible impurities are described: Phosphoric, phosphorous, sulphuric, oxalic and tartaric acids, and potassium, the tests being the same as those described for the diluted acid in the 1890 U.S.P. A test for barium is given,

whereas in the former U.S.P. a test for calcium was described. An innovation is the "Time-limit Test for Heavy Metals," which takes the place of the specific tests for lead and for iron of the U.S.P. of 1890. Arsenic is detected by the "Modified Gutzeit's Test."

The assay consists of a simple neutralization, using normal potassium hydroxide v. s. in the presence of methyl orange as indicator; phenolphthalein was formerly used as indicator. The permanganate method for assaying this acid, described in the U.S.P. of 1890, has been dismissed as unnecessary. Acidum hypophosphorosum dilutum is made from the stronger acid by dilution. The stronger acid is the more stable, hence its introduction is to be regarded as a wise step.

Ammonii Salicylas, Ammonium Salicylate ($NH_4C_7H_5O_3$).—This salt is so little used that its introduction to the U.S.P. seems an unnecessary one.

Bismuthi Subgallas, Bismuth Subgallate.—"Bismuth subgallate should yield not less than 52 per cent. nor more than 57 per cent. of pure bismuth oxide" (Bi_2O_3). This salt is of somewhat variable chemical composition and therefore no chemical formula for it is given in the Pharmacopœia. It is approximately $Bi(OH)_2C_7H_5O_5$. The wisdom of the introduction of this salt must be apparent to all. It has been widely used for a long time under the trade name of dermatol and has been found a highly valuable remedy both for external and for internal use. It is official in the German Pharmacopœia. Satisfactory physical and chemical tests for identity are given in the U.S.P. as well as descriptions of tests for impurities, free gallic acid, nitrate, and arsenic.

The gravimetric process for its assay consists in thoroughly igniting 1 gramme of the bismuth subgallate in a porcelain crucible; it at first loses water, then chars, and finally leaves a yellowish residue; this, when cool, is treated with 5 c.c. of nitric acid, added drop by drop and warming until complete solution is effected, the resulting solution of nitrate is evaporated to dryness, the residue converted by ignition into bismuth oxide; this should weigh not less than 0·52 gramme nor more than 0·57 gramme.

Bismuthi Subsalicylas, Bismuth Subsalicylate.—This "should yield not less than 62 nor more than 64 per cent. of bismuth oxide." It is assayed in exactly the same manner as the foregoing. It is also official in the German Pharmacopœia. The tests for identity are the

standard ones and are easily carried out. Its chemical composition is variable but is approximately $BiOC_7H_5O_3$. It is also official in the Swiss and in the British Pharmacopœias.

Kaolinum, Kaolin.—"A native aluminum silicate consisting chiefly of the pure silicate ($H_2Al_2Si_2O_9 + H_2O$) powdered and freed from gritty particles by elutriation." It is official in the British Pharmacopœia under the same name, while Bolus alba is official in the German Pharmacopœia. Kaolin is a very pure clay. It was introduced into the Pharmacopœia because it enters into the preparation of cataplasma kaolini, but its use outside of this is very extensive, being used as a dusting powder, and combined with antiseptics as an application to wounds; it is also employed as an excipient in making pills of silver salts and of potassium permanganate. It does not decompose these substances as most of the organic excipients do.

Cataplasma Kaolini, Cataplasm of Kaolin.—This is similar to certain proprietary clay preparations. It is undoubtedly a very useful preparation and not an entirely novel one, for the peasants of Central Europe have long employed a mixture of clay and glycerin as a household remedy for many ailments, especially where poultices were indicated.

The U.S.P. preparation consists of kaolin, 577 grammes; boric acid, 45 grammes; glycerin, 375 grammes, together with thymol methyl salicylate and oil of peppermint.

Liquor Sodii Phosphatis Compositus, Compound Solution of Sodium Phosphate.—This compound is prepared by triturating sodium phosphate and sodium nitrate in a mortar with citric acid until complete liquefaction has taken place, then adding sufficient water to make a product of which 1 c.c. contains 1 gramme of sodium phosphate. This solution should be kept well stoppered and in a moderately warm place. The tests for identity are the standard tests for phosphate, nitrate and citric acid. A preparation similar to this has been in commerce for some time.

Magnesii Sulphas Effervescens (Effervescent Magnesium Sulphate).—This preparation may be used instead of the magnesii citras effervescens of the 1890 Pharmacopœia, which has been dismissed. A similar compound is official in the British Pharmacopœia. This preparation is more stable than the effervescent citrate of magnesia.

Mangani Hypophosphis (Manganese Hypophosphite, $Mn(PH_2O_2)_2 + H_2O$).—"It should contain not less than 97 per cent. of pure

manganese hypophosphite $(PH_2O_2)_2Mn + H_2O$." This salt enters into the preparation of syrupus hypophosphitum compositus. It is a pink crystalline powder, very soluble in water though not so in alcohol. Tests for the detection of carbonate, phosphate, calcium and arsenic are described.

Sodii Arsenas Exsiccatus, Exsiccated Sodium Arsenate (Na_2HAsO_4). —" It should contain not less than 98 per cent of pure anhydrous di-sodium-ortho-arsenate ($AsO(OH)ONa_2$)." It is an amorphous white powder, odorless and permanent in dry air. It is made from sodii arsenas ($Na_2HAsO_4 + 7H_2O$), which is also official, and which it is certainly a mistake to have retained. The latter contains over 40 per cent. of water, and is therefore nearly one-half the strength of the exsiccated salt. Confusion, mistakes and danger are liable to occur. That the exsiccated salt, which is more stable, should be made official is commendable, but it is an evident mistake to retain the other salt. The only excuse it has for being official is that the exsiccated salt is made from it, but then the directions for making the exsiccated salt might better have been omitted. The hydrous sodium arsenate was official also in the U.S.P., 1880, under the name of sodii arsenias, and a process for its manufacture given. It is efflorescent in dry air, and deliquescent in moist air. Therefore, unless the salt was perfectly fresh the percentage of arsenic was uncertain. Hence the introduction of the new anhydrous salt, which is more stable, and therefore of more certain composition, is a great advantage. It enters into liquor sodii arsenatis.

The Pharmacopœia describes four tests for identity; one test for presence of arsenite as an impurity, and one for the detection of lead, copper and iron by the use of ammonium sulphide T.S.

Sodii Carbonas Monohydratus, Monohydrated Sodium Carbonate ($Na_2CO_3 + H_2O$).—" It should contain not less than 85 per cent. of pure anhydrous sodium carbonate $CO(ONa)_2$, corresponding to not less than 99·5 per cent. of the crystallized monohydrated salt." This salt is introduced with the object of furnishing a sodium carbonate of uniform strength and of stable character. Sodii carbonas and sodii carbonas exsiccatus, U.S.P., 1890, have been dismissed. Sodii carbonas was a very efflorescent salt; it contained 10 molecules of water of crystallization, which amounts to about 63 per cent. of its weight. Upon exposure to air much of this is lost, so that the salt is of uncertain strength. Sodii carbonas exsiccatus

retained 2 molecules of water of crystallization, or about 26 per cent., and is very hygroscopic, and therefore like the crystalline salt of uncertain and varying strength. Thus the introduction of sodii carbonas monohydratus furnishes a salt the composition of which is definite, and, being only very slightly efflorescent and hygroscopic, it may be depended upon as being more uniform than the two carbonates of sodium formerly official.

The U.S.P. gives three tests for identity, namely, the alkalinity test with litmus, the effervescence test, and the sodium-flame test. Impurities are detected by the time-limit test for heavy metals. It is titrated with half-normal sulphuric acid v.s., using methyl orange as indicator.

The 1890 Pharmacopœia gave tests for the following impurities: Insoluble matter, sulphocyanate, calcium, potassium, chloride, sulphate, sulphite hyposulphites, ammonia, arsenic, lead and aluminum and iron, the four latter by the hydrogen sulphide test. It is astonishing that none of these impurities are directed to be sought in the new official salt, especially sulphate, chloride and calcium. The time-limit test may detect arsenic, lead and iron, however. The Pharmacopœia requires 99·5 per cent purity for the salt by volumetric analysis.

Sodii Citras, Sodium Citrate ($2Na_3C_6H_5O_7 + 11H_2O$).—"It should contain not less than 97 per cent. of pure sodium citrate ($2C_3H_4(OH)(COONa)_3 + 11H_2O$) and should be kept in well-stoppered bottles." It is slowly efflorescent, but not as deliquescent as potassium citrate. It is assayed by neutralization after ignition in the same manner as other organic salts of the alkalies.

Sodii Phosphas Effervescens, Effervescent Sodium Phosphate.—An effervescent sodium phosphate has long been in use, and a similar preparation is official in the British Pharmacopœia.

Sodii Phosphas Exsiccatus, Exsiccated Sodium Phosphate (Na_2HPO_4).—"It should contain not less than 99 per cent. of pure anhydrous sodium phosphate ($PO(OH)(ONa)_2$) and should be kept in well-stoppered bottles." This is a very deliquescent salt. The crystallized sodium phosphate ($Na_2HPO_4 + 12H_{20}$) contains 60 3 per cent. of water; 355·61 parts contain 214·56 parts of water. The same quantity of the exsiccated salt contains no water, therefore 141·05 parts of the exsiccated salt are equal in strength to 355·61 parts of the crystallized salts, which means it is about 2½ times as strong.

Although the Pharmacopœia directs that the salt should contain not less than 99 per cent of the pure salt, it gives no assay method. It enters into the preparation of the effervescent sodium phosphate.

Strontii Salicylas, Strontium Salicylate ($Sr(C_7H_5O_3)_2 + 2H_2O$).—It should be not less than 98·5 per cent. purity. It is soluble in 18 parts of water and in 66 parts of alcohol. In the U.S.P. of 1890 strontium bromide, iodide and lactate were official, in the present revision the lactate has been dropped, and the salicylate (a much better preparation) has been introduced.

The Pharmacopœia describes eight tests for identity, and for the detection of impurities recommends the time-limit test and a test for barium. The assay is a gravimetric one, depending upon the conversion of the salt into strontium sulphate. It may also be assayed volumetrically by neutralization after ignition.

Talcum and *Talcum Purificatum* are both official. The former is native hydrous magnesium silicate, in powder or masses. It is also official in the German Pharmacopœia. Talcum purificatum is to be found in the National Formulary, and is used as an aid in filtering turbid liquids containing finely divided matters in suspension which are apt to pass through the filter or to stop up its pores. It is used in the U.S.P. method of preparing official waters of volatile oils, in the same way as in previous revisions of the U.S.P. there was used magnesium carbonate, then absorbent cotton, and then precipitated calcium phosphate.

Talcum purificatum is prepared from native talcum by treatment with hydrochloric acid.

Unguentum Acidi Borici contains 10 per cent. of boric acid in a base consisting of white petrolatum with 10 per cent. of paraffin. A similar preparation is official in the German and in the British Pharmacopœias.

Unguentum Hydrargyri Dilutum, Blue Ointment, contains 67 per cent. of unguentum hydrargyri and 33 per cent. of petrolatum. Unguentum hydrargyri is as before 50 per cent., therefore the diluted ointment is 33·5 per cent. The stronger ointment is called "mercurial ointment" and the diluted preparation is known as "blue ointment."

A very useful and satisfactory assay process for unguentum hydrargyri is official. This ointment is official in the German Pharmacopœia under the name of unguentum.

Hydrargyri cinereum, lanolin being employed instead of oleate of mercury.

Unguentum Zinci Stearatis is also official, it consists of equal weights of zinc stearate and white petrolatum.

Zinci Phenolsulphonas, Zinc Phenolsulphonate ($Zn(C_6H_5O_4S)_2$).—This salt has long been used under the name of zinc sulphocarbolate, and is official in the British Pharmacopœia under that name. It should contain, in uneffloresced crystals, not less than 99·5 per cent. of pure zinc paraphenol sulphonate $(C_6H_4(OH)SO_3)_2Zn + 8H_2O$. No method for its preparation is given. The British Pharmacopœia directs it to be prepared by heating a mixture of phenol and sulphuric acid, and saturating the product with oxide of zinc, evaporating and crystallizing. This is a useful and welcome addition to the United States Pharmacopœia.

Five tests for identity are described. The impurities, arsenic, cadmium, lead and copper, are detected by means of the Time-limit Test, sulphate and chloride in the usual manner, and arsenic by the modified Gutzeit's Test.

Zinci Stearas, Zinc Stearate.—This salt contains a small but varying proportion of zinc palmitate; no chemical formula is given, and no directions for its preparation. This salt is extensively used as a dusting powder. It enters into the newly official unguentum zinci stearatis.

[*To be continued.*]

HENRY N. RITTENHOUSE.[1]

By Helen M. Lawrence.

Henry Norman Rittenhouse was born December 31, 1831, at the southeast corner of Crown and Vine Streets, Philadelphia, then a residential section of the city. He was the only child of Henry and Eliza Norman Rittenhouse, and a descendant of David Rittenhouse, the astronomer. His father was a carpenter and builder of prominence, and was identified with numerous important operations of the day, among which may be mentioned a portion of the Girard estate.

[1] It may be of interest to our readers to know that the writer of the above sketch of Mr. Rittenhouse, Mrs. Helen M. Lawrence, is his daughter. Mr. Rittenhouse is also survived by a widow and one son, David Smith Rittenhouse, of Philadelphia.—Editor.

The early youth of the son was spent on a farm near Norristown, Montgomery County, Pa. As is generally the case with those on the farm, his opportunities for attending school were limited, but having a strong desire to learn and being possessed of an indomitable will, it is not surprising, as he grew older, he made opportunities for himself, profiting accordingly. When about twelve years of age he returned to Philadelphia and entered the employ of Homer & Colladay, a dry-goods firm, as errand boy. While still in their employ, Dr. Wynkoop, a druggist, whose store was located at Thirteenth and Lombard Streets, took him; but being anxious to see the boy advance, thought it would promote his welfare to transfer him to Edward Parrish, which was accordingly done. Later he entered the employ of Wm. Hodgson, Jr., one of the most accomplished apothecaries of our city, where he learned the drug business, and in 1851 entered the Philadelphia College of Pharmacy, graduating in 1854. From this date he carried on the retail drug business in Philadelphia until August 13, 1862, when he received his appointment as Medical Store-keeper, with the rank of Captain in the United States Army, with headquarters at Cincinnati, O., in which office he remained until his resignation in February, 1865, when he again took up the drug business, being admitted to the firm of Parrish & Mellor in June of the same year.

During the early part of the Civil War he made the acquaintance of Mr. Alfred Mellor, they both being interested in making collodion, used in the manufacture of a ball cartridge for the United States Government. After an interval of two years with Messrs. Parrish & Mellor he entered into partnership in 1867 with Mr. Alfred Mellor under the firm name of Mellor & Rittenhouse, with their laboratory at 816 Filbert Street, Philadelphia. The general business of the firm was the manufacture of pharmaceutical extracts and preparations. From their knowledge of the requirements of the trade it occurred to them that an extract of licorice made in this country might be a desirable addition to their list. The introduction of this preparation, though requiring considerable effort and time, was persevered in until finally, its success assured, other preparations were abandoned, and better quarters and machinery being required, a location was secured at 218 North Twenty-second Street, where for a number of years the manufacture of extract of licorice was the sole business. The business still increasing, the

firm was incorporated in 1886 under the name of the Mellor & Rittenhouse Company. Though the name of the company remained unchanged until recent times, Mr. Rittenhouse's retirement took place in 1890, after which he was not actively engaged in any business. His interest, however, in the affairs of the drug world never lessened, and with the subject of licorice still of the greatest possible interest to him, he conducted numerous experiments and lines of investigation looking toward the introduction of the growth of licorice root in this country, some interesting articles on the subject having appeared at various times in this JOURNAL.

While the affairs of his immediate business absorbed his time and attention, he still found opportunities during his active career to devote to other interests, public as well as personal. In 1867 he became a member of the Philadelphia Drug Exchange, and retained his membership for thirty-eight years, twenty-four years of which he was a director; vice-president in 1874–75, and president for one year, in 1881. He also served on many committees, representing the Philadelphia Drug Exchange in matters relating to their immediate interests and in affairs calling for their co-operation as a representative organization. He was also closely identified with the affairs of the Philadelphia College of Pharmacy, being elected a member December 18, 1854. He was elected a member of the Board of Trustees first on March 29, 1858, he having served the College in this capacity for a number of years at different times. He was also elected a member of the Publication Committee, March 30, 1874, having been the chairman of the committee from 1874 to 1894, and treasurer from March, 1894, to April, 1902. The long faithful service which he rendered the College as a member of the Publication Committee has been commented upon in highly complimentary terms, and a unanimous vote of thanks was extended to him for the twenty-five years of faithful work he gave the College in that important position. He was a life member of the American Pharmaceutical Association, and at the time of his death, one of its oldest members, having joined the association in 1857. During the year 1864-65, he served as recording secretary.

He was not identified with any clubs, his greatest interests being centered in his home. His society connections were few, but to him a source of pride. He was a member of Montgomery Lodge, No. 19, F. and A. M., Pennsylvania Society, Sons of the Revolution,

and The Military Order of the Loyal Legion of the United States, serving in this latter body as a member of the Board of Governors of the War Library and Museum.

In his home, the place he loved best, surrounded by his books, which were a never-ending source of pleasure, interested in all that pertained to those around him, and always ready to give good cheer and counsel to those who sought help, he passed the declining years of his useful life until, on June 24, 1905, death claimed him.

He has entered into rest—a useful life well spent. Forceful in the execution of what he believed to be right, sincere in his convictions, courageous in misfortune, happiest when deepest in his beloved work, he had a character which drew to him friendships of life-long duration; and though at last, at the age of nearly 74 years, the mortal passed quietly away, there still remains to those who knew him the spirit of the man.

LONDON BOTANIC GARDENS.

By Pierre Élie Félix Perrédès, B.Sc., F.L.S.,
Pharmaceutical Chemist.

A Contribution from the Wellcome Research Laboratories, London.

(*Continued from p. 459.*)

The botanical history of Kew Gardens has been traced to the collections of exotic plants made by Lord Capel in his grounds at Kew, during the latter half of the seventeenth century. It was not until nearly a century later, however, that these grounds became something more than the pleasure gardens of a private mansion, containing a collection of "curious and ornamental plants" for the delectation of their owners.

For us the history of Kew begins with the installation of William Aiton as chief gardener to the Princess Augusta in 1759. With the co-operation of her scientific advisor, the Earl of Bute, this princess fostered the scientific development of Kew; and from Dr. Hill's catalogue of plants in the exotic garden of Kew, published in 1768, or nine years after Aiton's appointment, we are able to perceive that the cultivation of exotic plants at Kew had been pursued with vigor. A further development in this direction occurred in 1772, when the first collector, Francis Masson, was sent out from Kew to the Cape.

One of these early collectors, David Nelson, was assistant botanist on Cook's third voyage (1776–1779), and to him we are indebted for a collection of New Holland (Australian) plants, which contained the specimen from which the genus *Eucalyptus* was first described. In 1784 the Princess Augusta died, but her son and successor, George III, not only continued the work which his mother had begun, but he made its success assured by choosing Sir Joseph Banks as his scientific advisor in place of Lord Bute, and by entrusting to him the supervision of Kew Gardens. The collections increased rapidly, and in 1788 a house for the reception of Cape plants was erected, and another for Australian plants in 1792. The "*Hortus Kewensis*" of William Aiton was published in 1789, and in this important work accounts were given of these numerous acquisitions. It is to the influence of its collectors abroad during this period that Kew gradually came to be looked upon as the botanical headquarters of the Colonies. The collections accumulated by Sir Joseph Banks, the resources of his library, the magnificent illustrations of plants executed under his direction by the Austrian artist, Francis Bauer, and the unprecedented facilities for cultural experiment, effected, on the other hand, the transformation of Kew into a research center. After the deaths of George III and Sir Joseph Banks, in 1820, the activities of Kew suffered an eclipse until the reorganization of the institution in 1841. In that year Kew was placed in charge of a government department and became the property of the nation. Sir William Hooker was appointed director, and under his control and that of his successors in office the policy inaugurated by Sir Joseph Banks has not only been continued and developed, but the desire of the general public for a delightful pleasure-ground in the neighborhood of the metropolis has also been abundantly gratified.

The colonial expansion, nurtured during the closing years of the eighteenth century and at the beginning of the nineteenth, has been steadily developed in various ways. Botanic establishments have been founded in the various Colonies, and these have, for the most part, received their inspiration from Kew. The means by which this relationship has been brought about are briefly these: (*a*) The staffs of the Colonial establishments have been mainly recruited from Kew; (*b*) Kew, by collecting, propagating and redistributing new species and varieties of economic plants has thereby served as a connecting link between the various Colonial establishments; (*c*)

Kew has, by virtue of its advantages, accumulated an extensive herbarium and unique collections of economic products, and it possesses a staff of experts as well as a comprehensive library. We find, as a result, that the Colonial establishments have come to consider Kew in the light of a central bureau of information on matters of cultural and botanical import, and in response to this feeling a "Bulletin of Miscellaneous Information" was issued periodically from Kew during a period of thirteen years (1887–1899). But this is not all, for Kew, at the request of the Government, has from time to time directly carried out important undertakings for the especial benefit of the Colonies, such as the introduction of cinchona into India, the investigation of the coffee disease in Ceylon, and the inquiry into the economic resources of the West Indies by the former assistant director, Sir Daniel Morris, K.C.M.G., who is now Commissioner of Agriculture for Barbadoes, the Leeward and the Windward Islands.

The demand for men trained at Kew led to the adoption, in 1874, of a course of systematic instruction similar to that initiated forty-eight years previously by the Royal Horticultural Society in its gardens at Chiswick, and this training of gardeners constitutes the only direct educational work that has ever been undertaken at Kew. Indirectly, however, Kew has been instrumental in promoting the teaching of botany in other institutions, as the following examples will testify: It is to the ex-Director of Kew, Sir Joseph Hooker, that we are indebted for one of the most authoritative text-books on the flora of these islands, viz., "The Student's Flora of the British Islands." The "Primer of Botany," by the same author, has also done much to encourage the teaching of botany in elementary schools, and the same may be said of the "Elementary Lessons in Botany," from the pen of Prof. Daniel Oliver, who was formerly Keeper of the Herbarium at Kew and Professor of Botany at University College. The formation, in 1880, of a students' garden, in which students were allowed to gather specimens, was as its name implies, designed to meet the needs of the botanical student; and the supply, from time to time, of cut specimens to a number of schools and colleges has also subserved educational ends. It must be noted, however, that the work accomplished by Kew in this direction has been largely adventitious in character, and has of later years been relegated to the Chelsea Physic Garden and to the Gardens in Regent's Park, as evidenced by the suppression of the

students' garden and by the withdrawal of supplies to schools. Kew, as a matter of fact, is not of much assistance to the elementary student, except in so far as it enables him to obtain a general view of the vegetable kingdom and its products. To the student of forestry, however, the Arboretum is invaluable, and the Indian Forest students from Cooper's Hill visit the gardens weekly during the Summer months on that account.

The work of Kew in the field of research has been so extensive and so varied that it will be necessary for us to consider these activities in a general way, and to content ourselves with the selection of a few illustrative examples.

The branch of botanical research in which Kew has achieved the greatest fame is, undoubtedly, that of Systematic Botany. The *Hortus Kewensis*,[1] a work which has already been mentioned, was the most important contribution to Systematic Botany that emanated from Kew before 1841. This, however, is an inconsiderable accomplishment when compared with later monumental works, such as the *Genera Plantarum*, of Bentham and Hooker; the *Index Kewensis*, of Hooker and Jackson, and the series of Colonial floras—*e. g.* the "Flora of British India," the *Flora Capensis*, and the "Flora of Tropical Africa,"—by various members of the staff and others. These achievements have only been rendered possible by the existence, at Kew, of a great Herbarium and an extensive Library. The herbarium of Sir Joseph Banks, his scientific library, and the collection of Bauer's drawings, had all been transferred to the British Museum after his death, so that the present Herbarium and Library, on which these publications are chiefly founded, are independent creations, in which the labors of Bentham and the two Hookers have played an important part.

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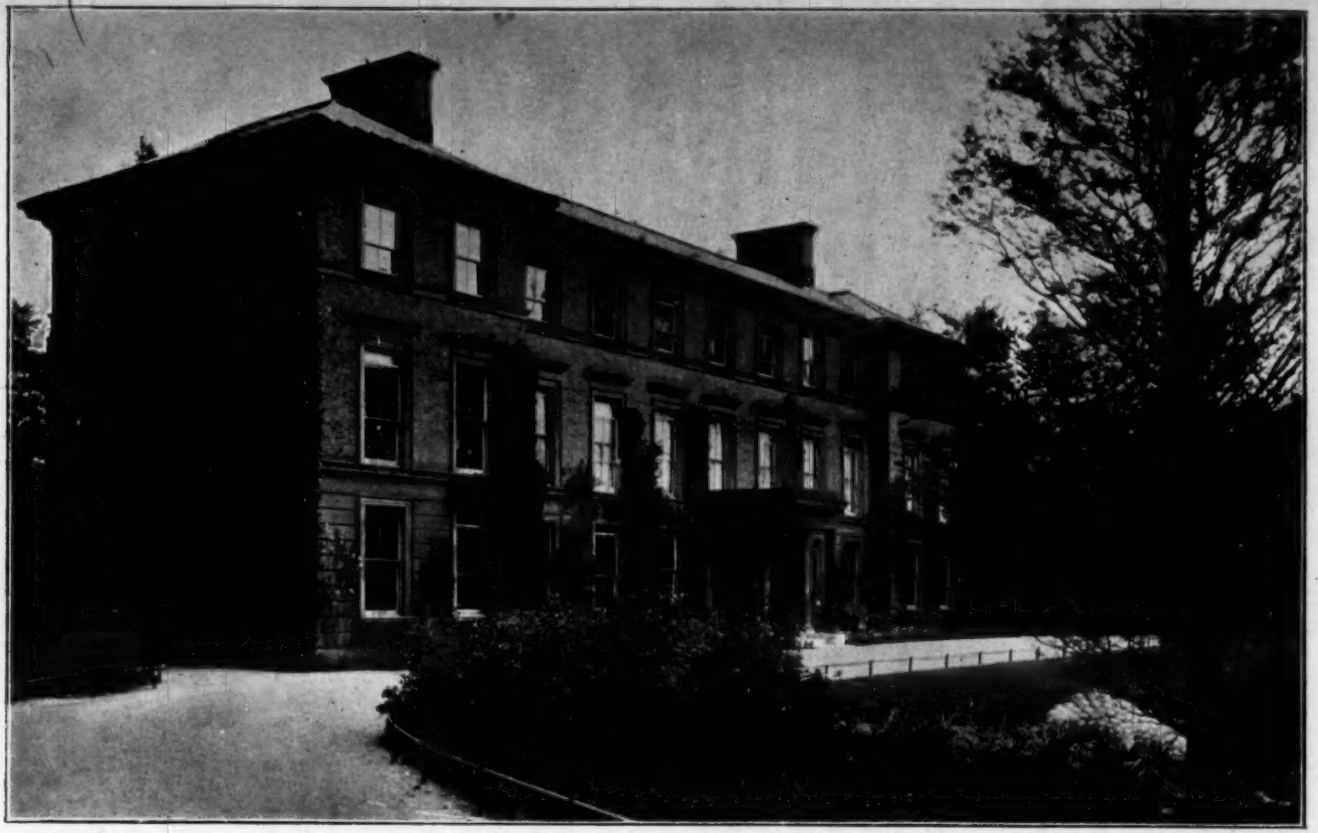
1 " . . . the 'Hortus Kewensis,' a work of three volumes, published in 1789, with the name of William Aiton, the King's gardener, on the title-page as author. It was actually the work of Daniel Carl Solander and of Jonas Dryander, in succession librarians to Banks; the original specimens from which the descriptions were drawn up are incorporated in the Banksian herbarium which is now in Cromwell Road [British Museum (Natural History)]. The second edition of this book in five volumes, nominally the product of William Townsend Aiton, son of the elder Aiton, was written partly by Jonas Dryander, who succeeded as Banks' librarian after the death of Solander, and completed by Robert Brown, who became librarian when Dryander died in 1810; the book appeared in 1810–1813."—Mr. B. D. Jackson in "Return. House of Commons." 1901, 205, p. 112.



Museum I, at Kew.

Curiously enough, it was also from Kew, the systematist's stronghold, that the movement originated which replaced the study of Systematic Botany in our universities by that of other branches of the science, such as morphology, physiology and cytology; for this result came about chiefly through the influence of the Jodrell Laboratory, completed in 1876, and of the English translation of Sachs' Text-Book of Botany, in the preparation of which the present Director of Kew assisted. Furthermore, it is of interest to record that the reaction which has become perceptible during the last few years, as well as the trend in the direction of ecological research, had its origin, not at Kew, but in the universities themselves. The work which has been accomplished in the Jodrell Laboratory is largely physiological in character, but cytological, morphological and anatomical investigations have also been actively prosecuted, as instanced by the epoch-making palæontological researches of Dr. D. H. Scott, illuminated by those of his associates, Messrs. W. C. Worsdell and L. A. Boodle, on modern plants. Among the researches that are of interest to pharmacists we may note Cross and Bevan's work on cellulose and de Wevre's investigations on Cubebs.

The first economic museum at Kew was established in 1847, when Sir William Hooker adapted the building now known as Museum No. II, for the reception of "all kinds of *Fruits* and *Seeds*, *Gums*, *Resins*, *Dyestuffs*, *Drugs*, *Sections of Woods* and all *curious vegetable products*, especially those that are useful in the *Arts*, in *Medicine* and in *Domestic Economy*." It is from these small beginnings that the present extensive collections, requiring three museums for their accommodation, have been developed, largely through the liberality of the Indian Government and of the India Office. The existence, side by side, of extensive collections of drugs, of a unique Herbarium, and of important living collections, has presented a wide field to investigators in the domain of pharmacognosy, and we accordingly find that pharmacists who have distinguished themselves in that branch of their calling have invariably availed themselves of the facilities provided by Kew. Among these workers we may mention J. E. Howard, Daniel Hanbury, and E. M. Holmes, not forgetting that many investigations on economic botany have been contributed to the Kew *Bulletin* by members of the staff at Kew.

This survey of the London Botanic Gardens would not be complete without some reference to their administration, and, with a

brief account of this, we may appropriately conclude our introduction.

Kew is administered by a government department, namely, the Board of Agriculture, but the organization and direction of the scientific work of the establishment are entirely in the hands of the Director.

The Royal Botanic Society, on the other hand, is a self-supporting body, and depends for its existence upon the subscriptions of its Fellows. The Society's Gardens in Regent's Park are administered by a garden committee of the Council, the Council itself being elected by vote of the Fellows. The executive officer is the Secretary.

The government of the Chelsea Physic Garden is vested in a committee of management consisting of members appointed by the Trustees of the London Parochial Charities, the Treasury, the Lord President of the Council, the Technical Education Board of the London County Council, the Royal Society, the Society of Apothecaries, the Royal College of Physicians, the Pharmaceutical Society, the Senate of the London University, and the representative of Sir Hans Sloane. The Professor of Botany in the Royal College of Science is Scientific Advisor to the Committee, while the funds necessary for the maintenance of the garden are derived chiefly from grants by the London Parochial Charities and the Treasury.

THE ROYAL HORTICULTURAL SOCIETY'S GARDENS.

The Royal Horticultural Society of London was founded in 1804 for the purpose of encouraging the cultivation of ornamental and useful plants. The latter class comprises forest trees and plants yielding various food products, such as fruit trees and culinary plants, but those which fall more particularly within the province of agriculture or medicine are excluded. In 1809 the Society obtained its first charter, and in 1818 a first attempt was made towards the establishment of a garden. In 1819 another piece of ground was taken at Ealing, and the work accomplished there was further supplemented by that of nurserymen in the neighborhood of London, to whom nursery stock and plants were lent. These undertakings, however, were tentative in character, and it was not until 1821 that they took definite shape. In that year the Chiswick Gardens, then thirty-three acres in extent, were established, and they survived,

through many vicissitudes, until 1904, although having then shrunk to an area of twelve acres. Between 1861 and 1887 the activities of the Chiswick Gardens suffered an almost total eclipse, owing to the fact that the Society was involved during that period in a scheme which absorbed all its energies and crippled its finances. This scheme, fostered by the late Prince Consort, consisted in an agreement between the Society and the commissioners of the Great Exhibition of 1851, by which the management of the gardens and conservatory at South Kensington was entrusted by the commissioners to the Society on certain conditions. These conditions were not fulfilled, and in 1887 the commissioners appropriated the land for other purposes. This action led to the reorganization of the Society on its former basis and to the renewal of activities at the Chiswick Gardens. For some time past, however, these gardens, owing to their limited size and to excessive drainage and smoke, had been found unsuitable for the purpose which they were designed to serve. The need of the Society for more suitable accommodation was met in 1903 by Sir Thomas Hanbury, K.C.V.O., who purchased 60 acres of land at Wisley, in Surrey, including the celebrated wild garden of the late G. F. Wilson, F.R.S. This property was placed in trust for the use of the Society, so long as it continued to be used by the latter for the objects aimed at by its founders. Among the prominent features that the Society is introducing into its new gardens we may mention a collection of named varieties of fruit trees, a series of glass houses for experimental culture, and a representative arboretum and rose garden, while the establishment of a physiological laboratory is also contemplated.

This description of the gardens themselves must suffice, but some of the salient features of the work accomplished by the Society prior to 1860, in connection with its gardens, will be touched upon. The Kew system of sending plant collectors abroad was adopted by the Society in 1818, and the plants sent home by them helped to form the collections in the gardens at Chiswick. Among these emissaries mention may be made of George Don, who was sent out in 1821 to the West Indies and Brazil; of Robert Douglas, who explored western North America between 1823 and 1834 and introduced many interesting ornamental plants and forest trees; and of the renowned Robert Fortune, who was sent to China by the Society in 1842. In 1822 Lindley was appointed assistant garden secretary

to the Society, and four years later he became its sole assistant secretary. George Bentham was honorary secretary from 1829 to 1840, and it was to the labors of these two distinguished men that the fame of the gardens in their early days was chiefly due. In 1826 a course of training was inaugurated in the gardens, and this is of interest, inasmuch as the Society was the first in this country to train gardening students. Among the Society's pupils who subsequently achieved distinction we may note Archibald Barron, Sir Joseph Paxton, who designed the Crystal Palace; Robert Thompson, and many others. Bentham and Lindley organized the first flower show at Chiswick in 1833, and it was also during their period of office that the system of heating plant houses by means of hot-water pipes was first resorted to. The naming of the large number of new plants introduced by the Society was carried out principally by Bentham, with the assistance of Lindley, until the resignation of the former from the secretaryship in 1841; the major part of the Society's work then devolved upon Lindley, and, until illness compelled him to relinquish his duties, he was the moving spirit in all the Society's activities. It is in connection with this matter of nomenclature that the Society has rendered one of the greatest services to horticulture, as it is the home of the nomenclature of fruit as well as the parent of the Colonial fruit industry which has now assumed extensive proportions. The first publication issued by the Society was the *Transactions*. This was published from 1805 to 1848, and was followed in 1845 by the *Journal*, which has been issued periodically ever since and constitutes the most important publication of the Society.

A PLEA FOR GREATER ATTENTION TO THE SCIENTIFIC NEEDS OF THE BUSINESS PHARMACIST.[1]

By E. H. Gane, Ph.C., New York, N. Y.

In selecting the subject matter for the annual address to this section I have been influenced mainly by the steadily decreasing interest taken by the great body of pharmacists in the work of our association. While I do not agree with the gentleman who stated at one

[1] Address of the chairman of the Scientific Section of the A. Ph. A. at Atlantic City, September 6, 1905.

of the State association meetings that the American Pharmaceutical Association was in danger of dying of dry rot, I do think that to some degree we have, as it were, reached a "parting of the ways," where it becomes necessary for us to pause for the purpose of determining whether this association shall represent only the purely scientific side of pharmacy and rest content with a small membership, or whether it be not possible to combine our scientific work with the commercial applications thereof, so as to secure recognition from the great mass of business pharmacists.

A WEAK SPOT SOMEWHERE.

We cannot look back over the past record of this association and of this section in particular without a feeling of pride in its achievements for the advancement of the scientific side of pharmacy. But, while taking pride in its scientific achievements, we must not lose sight of the fact that science is of value to the pharmacist only so far as he can make practical application of it. In other words, we must not forget that pharmacy is not in any sense a pure science. It is not confined merely to knowledge of chemical and botanical substances. It includes the practical applications of nearly all chemical and vegetable substances to medicine and to the arts. It should be one of the greatest of applied sciences, and the pharmacist should occupy as high a position as the physician or the chemist. The fact that he does not shows that somewhere in our organization there is a weak spot. In older countries this lack of recognition was attributed to the fact that universities did not recognize pharmacy as worthy of inclusion in their course of study, but this reason fails us when we consider the numerous departments of pharmacy attached to our own universities.

The appeal has frequently been made for more investigations by pharmacists in pure science. That appeal has not been disregarded. Indeed, the tendency of pharmaceutical investigations of late years has been more and more in that direction, and to some extent this is responsible for the lack of interest displayed by the rank and file of pharmacists. Not that I wish for a moment to disparage such work; investigations in pure science are a necessary part of the work of this section. But side by side with investigations in pure science we need to give more attention to the problems confronting the practical pharmacist which require for their solution the aid of

our scientific investigators. What hope is there of securing due recognition of the applied science of pharmacy when the perhaps more fascinating field of pure science attracts most of our most capable workers?

THE SCIENTIFIC CHARIOT IS BEING DRIVEN TOO FAST.

We are tending too much toward the ultra scientific in the work of this section, thus creating a wide gap between the great body of pharmacists and the few to whom they should look for guidance and assistance. We are going ahead too fast for the business pharmacist and assuming too much interest on his part in scientific studies to the neglect of the latest advances in galenical pharmacy.

The new Pharmacopœia strikingly illustrates the truth of these statements. Its chemistry, its botany, its pharmacology show that the revisers have closely studied the latest advances in those sciences, so that little exception can be taken to that portion of the work, but it does not reflect progress in galenical pharmacy. It even exhibits a tendency to follow a section of the medical profession in taking part of its pharmacy from the advertising publications of certain proprietary remedy manufacturers. It may be argued that this is only a reflection of existing conditions in pharmacy, but even so the wisdom of giving it official sanction is doubtful in these days of exactitude in science. The inevitable tendency will be to concentrate the whole of the scientific part of pharmacy in the hands of the manufacturers, thus diverting the interests of pharmacists from pharmaceutical research.

WHAT AMERICAN PHARMACY NEEDS TO-DAY

is a revival of interest in strictly pharmaceutical problems. True, we have a section devoted to practical pharmacy, but the average pharmacist lacks the necessary time and training to pursue scientific problems to a satisfactory conclusion. This work can only be performed properly by those interested in the work of this section. There are many problems awaiting solution which this section could consider without in any way compromising the dignity which rightly surrounds it. A glance at the literature of pharmacy during the last few years shows that progress in pharmacy is practically at a standstill in this country. The era of proprietary specializing may have something to do with this state of affairs, but it is undoubtedly

aided by the preference of investigators for the field of pure science. And yet, even in connection with the commonest of pharmaceutical preparations, there is much research of a scientific character needed. Under existing conditions the ultimate benefit from such researches will go to the manufacturer and not to the pharmacist, but there is still enough pharmaceutical research left and enough in the latest developments of the science and art of healing to prevent the pharmacist from becoming a mere dealer in manufactured specialties.

A REMEDY SUGGESTED.

It is to this section that the pharmacist looks for relief. We need to adopt a more aggressive attitude in dealing with pharmaceutical problems. We have been too prone to bow before the chemist on the one hand and the physician and the surgeon on the other, and to be kicked by both. The pharmacist should lead in knowledge of drugs, their behavior and the best methods of presentation. It should be his part to make practical applications of the results of scientific research, to aid in replacing crude drugs by definite principles, and to urge the abandonment of unscientific and inert products. Individually he can do little, but definite action by this association in co-operation with the American Medical Association should do much to restore his prestige. The suggestion made some years ago by the special Committee on Research to the effect that this association co-operate with the American Medical Association received no attention; hence we have the appointment by the latter body of a Council on Pharmacy and Chemistry, which is a distinct reflection upon the work of this section. The fact that most of the members of the new council are leading members of this association shows that we have not been alive to our opportunities. It would seem that work of the kind initiated by the American Medical Association should at least have been done after consultation with this section, if not in direct conjunction with it. The present agitation affords us an opportunity to get in closer touch with the American Medical Association. Unless guided aright the latter body may do much harm to the cause of pharmacy, and this section should take steps even at this late date to co-operate with the American Medical Association in any investigations the latter may undertake which are of direct pharmaceutical interest. As experts in the science and art of pharmacy we should be quick to

prevent or to resent the usurpation of our functions either by the medical profession or the chemist. As above indicated progress will be slow if left to individual workers. We need to follow the tendency of the times and co-operate in our work. Many scientific bodies to-day adopt the plan of holding symposia on given subjects from time to time. This idea has many advantages. If adopted by us it would systematize to a large extent the work of this section, render it more interesting to the business pharmacist, because more definite results are thus obtained, and it would in particular aid the revisers of future editions of the United States Pharmacopœia. It would not, moreover, interfere with the work of individuals, and its good results have already been exhibited in the reports of the Special Committee on Indicators and the co-operative work on opium assays.

The by-laws of the association instruct the officers of this section to prepare a list of suitable subjects for investigation. This instruction has been more honored in the breach than in the observance thereof, because each worker has been free to follow the line of investigation in which he is especially interested, and this frequently has been of little direct pharmaceutical interest. With the adoption of the co-operative idea it would be possible either for the officers of this section or for a special committee not only to prepare a list of practical subjects for discussion, but to select the investigators best fitted to carry out the work. It should not be difficult to select some subjects which would induce business pharmacists to interest themselves in the work.

SCIENTIFIC SIDE LINES FALLING INTO OTHER HANDS.

Perhaps the greatest advance of recent years has been the application of physical methods to chemical research. It is a branch of chemistry which has already produced brilliant results, and it is a side which is bound to develop more and more every year. It would seem that more attention should be paid to physical problems, not only in our schools of pharmacy, but in the contributions offered to this section. Already certain discoveries in physical science are being applied to medical purposes, and here and there a pharmacist has been quick enough to see the business possibilities therein, but it should be the duty of the leaders in this section to point out to their *confrères* the application of these discoveries to pharmacy. One

by one what I may call the legitimate scientific side lines of pharmacy have passed into other hands through lack of proper information from sources that should guide the business pharmacist.

But by far the most important work confronting us in the immediate future is the question of food and drug adulteration. The vicious attacks of certain proprietary medicine interests through the daily press, and the outcry on the part of ill-informed pure food and drug fanatics are to some extent undermining public confidence in the pharmacist. One of the fundamental objects for which this association was founded was to secure purity in drugs and chemicals, to suppress empiricism and to confine the sale of medicines to regularly qualified apothecaries. Of late years little has been done in this direction until the appointment at the St. Louis meeting of the Special Committee on Drug Adulterations. This committee has been continued from year to year by the chairman of this section, but without regular authorization. The results which have been already reported would seem to warrant its continuance as a standing committee of this section. If the work be continued upon the lines inaugurated by Professor Patch it can be made one of the most powerful influences for the good of the association, the benefit of the retail pharmacist and the general public. It is the commencement of the first systematic attempt to determine to what extent adulteration of drugs and chemicals is practised, and it is gratifying to note that some of the State associations are doing similar work.

The widespread agitation regarding adulterated drugs is to some extent manufactured either for personal or political ends. That adulteration exists we know, but to what extent we do not know, nor do those who are engaged in fostering the agitation; but it is a serious menace to pharmacy in that it represents an organized attempt to take away from pharmacists the control of pharmaceutical products. Such an attempt should be resisted by every means in our power.

DANGER FROM OFFICIAL CHEMISTS.

In an effort to find out what knowledge is possessed by those State officials and chemists who aid in fomenting the question, a letter was addressed to the principal officials of those States which have commissions devoted to food and drug examination asking whether any systematic effort had been made to ascertain to what extent

adulteration of drugs was practised. The further question was asked by what standards the purity of drugs and chemicals was determined. The replies show that in only two or three States has any attempt been made to ascertain facts. Most of the officials state frankly that no work has been done, in some cases from lack of appropriation, in others because they have no direct power, and in some because food work takes up all the time of the chemists. It is instructive to note that many of them express the hope of obtaining legislation and appropriations in the near future. Some vaguely state that there is no doubt that adulteration of drugs is practised to a considerable extent. The replies to the question of standards show that the United States Pharmacopœia is taken as the standard for drugs mentioned therein, but in other cases the standards are arbitrarily fixed by the officials themselves. It is obvious, therefore, that we must be on the alert to avert danger from this source. Already, in spite of warnings, control of drugs and pharmaceutical products has, in at least one State, passed out of the hands of pharmacists. This is largely due to the lack of systematic work on our part. We have already pledged the support of this association to the Bureau of Chemistry in the work they are undertaking, and this support should be material and not merely consist of abstract resolutions. At present we are leaving to chemists, State and Federal officials, work that should be done by ourselves, and we are allowing positions that could and should be filled by pharmacists to be filled by graduates from technical schools and universities, who formulate what have been called "arm-chair standards," and who indulge in "yellow chemistry." The fixing of standards of purity properly belongs to this section, and should form part of our work, either through a special committee or through the Committee on the Drug Market. It should not be left to the pure chemist, for the latter lacks the practical pharmaceutical knowledge and commercial experience which is necessary for the proper formulation of standards.

A QUESTION OF DIRECT INTEREST.

One of the questions directly of interest to the drug trade is that of the use of antiseptics or preservatives and coloring matters in foods and drugs. Manufacturers on the one side and chemists on the other are fiercely debating the subject, and we are apparently

patiently awaiting the result. Is not this a matter in which our particular expert knowledge should be of service? Is it not distinctly a pharmaceutical and medical question? We might well appoint a committee first, to determine whether such adventitious aids are necessary to the proper preservation of foods and drugs, and later, if an affirmative answer be given, to confer with a similar committee of the American Medical Association to determine what coloring matters and preservatives may be classed as harmless, and in what proportion they may be used to secure the desired result without detriment to the public health. This would give us additional opportunity to get in close touch with the leaders in medicine. It is a subject that should not be left to State and Federal officials to determine arbitrarily.

THE SECTION AS A SOURCE OF EXPERT ADVICE ON SCIENTIFIC SUBJECTS.

The agitation by this association of the "coal-tar creosote" question has already borne good results in stopping the sale thereof except under proper precautions. More speedy results would have been obtained had definite action followed the passage of resolutions. Action should be taken by us against the increasing use of wood alcohol in pharmaceutical and household preparations. Recent researches seem to show that methyl alcohol even in its purest form is a dangerous drug when taken internally. The American Medical Association passed a resolution condemning its use, and this section, through the Committee on the Drug Market, should take steps to prevent the sale of the article except under proper precautions. True, we have no legal powers, but the influence of this body is powerful enough if properly exercised to induce at least the majority of manufacturers to follow our advice. Continued action of this kind would ultimately lead the trade to look to this section for expert advice on scientific questions.

The American Chemical Society is giving considerable study to the question of purity in chemicals used for analytical and research work, and will attempt to formulate standards of purity and later to authorize a series of labels by which manufacturers may designate their products, according to the degree of purity and freedom from particular impurities. Is it not equally incumbent upon this association to formulate standards of purity for unofficial chemicals and drugs used in medicine and for household purposes, not only for the

protection of the public, but to protect the pharmacist against unjustifiable prosecution under pure food and drug laws. The Committee on the Drug Market has already started this work consequent upon prosecutions instituted by the Massachusetts State officials for selling unofficial products which did not conform to their arbitrary standards. Unless we take a more active interest in questions of this kind, about the only work of scientific import of direct pharmaceutical interest left for us to do will be to furnish aid in the revision of future editions of the pharmacopœia.

THE DUTY OF THE PHARMACIST.

The powers of the Committee on the Drug Market should be enlarged, and while keeping a watchful eye to detect variations from established standards of purity in drugs and chemicals, its work might well be extended to prevent the sale of many of the utterly fraudulent products offered to the general public to-day. We secure special privileges on the sole ground that the public needs protection from inexpert dealers. Is it, not, therefore, part of our duty to protect the public from the impositions of those who seek to exploit fraudulently the latest achievements in medicine or science? The legal part may be left to the properly constituted authorities, but the exposure of such is properly part of our work. It should not be left, as it mainly is, to newspaper and magazine editors in search of sensations. The scientific portion of the work belongs to this section, the rest would form part of the work of our newly established Committee on Publicity. By agitation of this kind we do not compromise our dignity to any degree, but we do show that the pharmacist is a person who has as definite a sphere of action as the physician or the chemist. We should seek not to pose as scientists in the strict sense of the term, but as experts in everything pertaining to drugs and medicines. More we do not need as pharmacists, by less we would fail to do our whole duty to the public.

By establishing our position in this way, we should be in a position to aid the agitation, already started in some quarters, for representation upon our State Boards of Health and upon food and dairy commissions, and, incidentally, aid in the control of the proprietary medicine business, which is recognized as one of the worst evils confronting pharmacy. Pharmacists have in this country opportunities presented which pharmacists of no other country possess,

and we have only ourselves to blame if we fail to grasp at least some of them.

Conditions in pharmacy at present warrant some departure from past customs. Some of the suggestions made in this address will doubtless appear to many rather iconoclastic. They are not made with any idea of getting the section to take definite action thereon immediately, but in the hope of creating discussion and arousing the interest of pharmacists generally in the affairs of this association.

BOOK REVIEWS.

THE NATIONAL STANDARD DISPENSATORY.—Containing the Natural History, Chemistry, Pharmacy, Actions and Uses of Medicines, including those recognized in the Pharmacopœias of the United States, Great Britain and Germany, with numerous references to other Foreign Pharmacopœias. In accordance with the United States Pharmacopœia, eighth decennial revision of 1905 by authorization of the Convention. By Prof. Hobart Amory Hare, Jefferson Medical College, Philadelphia; Prof. Charles Caspari, Jr., Maryland College of Pharmacy, Baltimore; and Prof. Henry H. Rusby, College of Pharmacy of the City of New York. Imperial octavo, 1,858 pages, 478 engravings. Cloth, $7.25, net; leather, $8.00, net; Thumb-index, 50 cents extra. Lea Brothers & Co., Publishers, Philadelphia and New York. 1905.

In the United States the dispensatories have been the commentaries on the Pharmacopœia. That there is a demand for these books is evidenced by the willingness of the publishers of the several dispensatories to spend large sums of money in their publication. When the purchaser receives 256 pages of encyclopedic information, such as is in the National Standard Dispensatory, at an expenditure of one dollar, one wonders that it is possible to do so at a profit to the publishers unless the sales are very great.

The present work succeeds the National Dispensatory of Stille and Maisch. Any one who is familiar with the old National Dispensatory might be inclined to question whether this work is not merely a revised edition of that work. A careful comparison shows, however, that it is an entirely new book. It is, as claimed by the publishers, "a new, practical and authoritative work, containing information on all substances used in medicine and pharmacy

at the present day." The names of the authors are a sufficient guarantee of its being an authoritative work on the drugs and preparations which are used in medicine at the present time. It requires new men to write a new book, and it is fortunate that the publishers secured the services of men in their prime and permitted them to entirely recast the book in accordance with the latest discoveries and researches. There has been a need of just such elimination as has been made in the constructing of the present dispensatory. There has been much in all of the dispensatories which is irrelevant to the books and of but little use to the readers. There is more real information, for instance, in the article of a page and a quarter on Abrus in the National Standard Dispensatory, than was contained in the two-and-one-half-page article on the same drug in the National Dispensatory.

Dr. Rusby has written the botany and pharmacognosy, including the minor as well as the major drugs of the entire globe, a service never before rendered. This part is supplemented by a large number of excellent illustrations by the skilful botanical artist, Mrs. Beutenmüller. Prof. Caspari, with a corps of assistants, has considered the pharmacy and chemistry of the book, giving full information regarding methods and products, with descriptions and explanations of the most approved apparatus and tests. Dr. Hare has written the section on Medical Action and Uses, giving a direct and compact presentation of modern therapeutics. An Appendix of 60 pages contains all necessary tables, formulas, tests, etc., for practical use. The General Index, of about 90 pages, contains full reference to every page in the text, making it a repertory of the world's knowledge of drugs, and the Therapeutical Index, of about 40 pages, contains, under the name of each disease, references to all the medicines employed in its treatment. The volume is embellished with about 478 new and instructive engravings in the text.

The National Standard Dispensatory is creditable to the authors and publishers and will be found useful as a reference book not only by pharmacists and physicians but also by chemists, botanists, and others desiring information on any of the substances used in medicine and in the arts.

A Manual of Organic Materia Medica and Pharmacognosy.—By Lucius E. Sayre, Dean of the School of Pharmacy of the Uni-

versity of Kansas. Third revised edition, with Histology and Microtechnique by Prof. William C. Stevens, with 377 illustrations. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. 1905.

This work of Professor Sayre's is intended as an introduction to the study of the vegetable kingdom and the vegetable and animal drugs comprising the botanical and physical characteristics, source, constituents, pharmacopœial preparations, insects injurious to drugs, and pharmacal botany.

The present edition of Professor Sayre's book is based on the eighth decennial revision of the United States Pharmacopœia. The entire work has been gone over; useless or "out-of-date" material has been eliminated; a number of new illustrations have been added and every attempt has been made to bring the book in line with the progress in pharmacy.

EXPERIMENTS FOR STUDENTS IN GENERAL CHEMISTRY.—By Prof. Edgar F. Smith, University of Pennsylvania, and Prof. Harry F. Keller, Central High School of Philadelphia. Fifth edition, enlarged, with 40 illustrations. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. 1904.

This little work of 92 pages is intended as a text-book in connection with a course in chemistry for beginners. There are some forty illustrations which will be found helpful to the student in constructing the necessary apparatus. The directions are clear and to the point. There are sufficient questions asked in the course of the work to compel the student to do some thinking on his own account. Taking it all in all the book will be found very useful and whether the student intends to become a chemist or follow any other vocation, he will secure a better grip on fundamental facts in physics and chemistry and a better idea of the nature of chemical elements and the interactions taking place in nature, after a course in chemistry in which a book of this kind is employed, than if he were to read all of the chemistries and not *do* anything for himself.

THE EVOLUTION OF THE CHEMICAL MATERIA MEDICA.

(*Continued from p. 474.*)

SUBSTANCES INTRODUCED BY THE ARABIANS.

Potassium nitrate; called by Geber "Sal petræ."

Acid, hydrochloric, in Aqua Regia. The purer article was known to Basilius Valentinus. Its production by distilling a mixture of sodium chloride and sulphuric acid was described by Glauber, hence its name "Spiritus fumans Glauberi."

Acid, nitric; known to Geber.

Arsenious acid, "white arsenic;" known to Geber. More reliable data was not obtainable until the middle of the XI. century.

Mercuric chloride; known to Geber, Rhases and also to Avicenna.

Mercuric oxide; known to Geber.

Silver nitrate; known to Geber, but was introduced into medicine by Angelus Sala during the XVII. century, when it was known as "Magisterium Argenti," "Crystalli Dianæ."

Alcohol, dilute; stronger alcohol was first produced by Raymundus Lullus, in the XIII. century, who introduced it into the materia medica as "ultima consilatio corporis humani."

Lead acetate; although this was known to Geber, it was not introduced or used as a medicine until 1760, when Goulard produced what was later known as "Aqua vegetomineralis Goulardi."

Camphor; this was first brought to Europe about the middle of the VI. century.

Aqua ammonia; was known to Geber, as was also a more or less pure caustic potash.

SUBSTANCES KNOWN TO, OR INTRODUCED BY, RAYMUNDUS LULLUS IN THE XIII. CENTURY.

Alcohol; stronger.

Ammonium carbonate; produced from urine.

White precipitate.

THE XV. CENTURY CONTRIBUTED:

Potassium sulphate; this may have been known to Isaac Hollandus in the XIV. century. Described by Oswald Croll, about 1608, as "Specificum purgans Paracelsi."

Sulphuric acid; the first known, accurate, description of this substance is attributed to Basilius Valentinus.

Zinc sulphate, "white vitrol;" known to Basilius Valentinus.

Ferric chloride, lead acetate and the spirit of nitrous ether were all known to Basilius Valentinus.

DURING THE XVI. AND XVII. CENTURY WERE ADDED.

Sulphuric ether; discovered by Valerius Cordus, about 1540, and by him described as "Oleum vitrioli dulce," this preparation appears to have been forgotten until rediscovered by Frobenius, a London apothecary, about 1730.

Mercurous chloride; known in Europe in the XVI. century.

Oil of anise, oil of cloves; known to Valerius Cordus.

Benzoic acid; known about 1608.

Antimony and potassium tartrate; produced by Adriano van Mynsicht, 1631.

Zinc chloride; mentioned by Glauber, 1648, as "Oleum lapidis caliminaris."

Sodium sulphate; known to Glauber, 1658.

Potassium permanganate; Glauber, in 1659, noted the peculiar color that was produced on fusing potassium nitrate with manganese dioxide. The composition of potassium permanganate was first described by Mitscherlich in 1830. The name "Chamælon mineraale" was given to it by Scheele.

Ammonium acetate; was introduced by R. Minderer during the XVII. century.

Phosphorus; discovered by Brand, in urine, about 1669. More carefully studied by Gahn, 1769, and by Scheele, 1771, who demonstrated its presence in bones.

Sodium borate; probably known at an earlier period, was reintroduced during the XVII. century by the Venetians.

Potassium, and Sodium tartrate; introduced about 1672, by an apothecary, P. Seignette, of Rochelle, France.

Magnesium sulphate; discovered 1694, by Nehemiah Grew, in the water of a mineral spring at Epsom, England.

DURING THE XVIII. CENTURY THERE WERE INTRODUCED.

Magnesium carbonate; introduced as a secret remedy, "Magnesia alba," about the beginning of the XVIII. century. The method of preparing was described by Valentini, 1707, and Slevogt, 1709.

The composition of "Magnesia alba" was demonstrated by Black, 1756.

Boric acid; produced by Homberg in 1702 by the decomposition of borax. Known as "Sal sedativum Hombergi."

Phosphoric acid; produced in 1746 by Marggraf.

Magnesium oxide; in 1755 by Black.

Ether, acetic; first produced by Lauragais, 1759. Method of producing improved on by Scheele in 1782.

Tartaric acid; by Scheele in 1768.

Chlorine; produced by Scheele in 1744, and first known as "Dephlogisticated muriatic acid."

Glycerin; discovered by Scheele in 1779 while preparing lead plaster. He called it "The sweet principle of oils."

Lactic acid; Scheele, 1780.

Citric acid; Scheele, 1784.

Gallic acid; Scheele, 1785.

Tannic acid; Berzelius.

Bismuth subnitrate; first used in medicine by L. Odier in 1786.

Sodium carbonate; first recognized as such by Duhamel, 1736.

Thymol; introduced about the middle of the XVIII. century.

OF THE MORE IMPORTANT DISCOVERIES OF THE XIX. CENTURY WE HAVE:

Morphine; discovered in 1804 by Sertürner, an apothecary's assistant at Paderborn, Germany.

Potassium, Sodium, Boron, in 1807, and Calcium in 1808; by Sir Humphrey Davy, by means of electrolysis.

Iodine; in 1811 by Courtois.

Naphthalin; by Garden in 1816.

Hydrogen dioxide; by Thenard in 1818.

Strychnine; by Pellitier and Caventou in 1818.

Veratrine; by Meiszner in 1818.

Brucine; by Pelletier and Caventou in 1819.

Quinine; cinchonine; colchicine; by Pelletier and Caventou in 1820.

Caffeine; Runge, 1820, and independently also by Robiquet in 1821, and by Pelletier and Caventou.

Potassium iodide; introduced into medicine by D. Coindet in 1821.

Potassium bromide; by Balard in 1826.

Bromine; discovered by Balard in Montpelier, France, in 1826.

Iodoform; produced by Sérullas in 1822, but not introduced into the materica medica until about 1837.

Santonin; discovered in 1830, independently of each other, by two German apothecaries, Kahler in Düsseldorf and Alms in Mecklenburg.

Atropine; isolated by Meins in 1831.

Codeine; by Robiquet in 1832.

Phenol; discovered by Runge, in coal tar, in 1834.

Salicylic acid; in 1839, Kolbe, in 1873, introduced it as an antiseptic.

Chloral hydrate; discovered in 1832 by Liebig. Was introduced as a medicine by Liebreich in 1869.

Chloroform; discovered by Liebig, and also by Soubeiran in 1831. Introduced into medicine by Simpson in 1847.

Theobromine; isolated from the seeds of Theobroma cacao in 1841 by Woskresensky.

Collodion; introduced in 1853 by Maynard and Bigelow.

Physostigmine; by Jobst and Hesse in 1864.

Resorcin; by Hlasiwetz in 1864.

Cocaine; isolated by Gædeke in 1864. Introduced into medicine in 1884 by Koller.

Formaldehyde; discovered by A. W. Hoffman in 1867.

Pilocarpine; Gerrard and Hardy in 1875.

Sodium salicylate; made synthetically by Kolbe's process in 1875.

Naphthol; 1881.

Apomorphine hydrochlorate; used in 1882. The free base had been discovered in 1869 by Matthiessen and Wright.

Antipyrine; discovered by Knorr in 1884.

Acetanilid; discovered by Gerhard, has been in use since 1886.

Phenacetine; 1887.

Saccharin; 1887.

Sulfonal; discovered by Baumann in 1888.

Trional; 1893.

M. I. WILBERT.

PHARMACEUTICAL MEETING.

The first of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1905-1906 was held on Tuesday afternoon, October 17th, with Prof. Samuel P. Sadtler in the chair.

The meeting was devoted to a discussion of the new Pharmacopœia, and in this connection two papers were presented, one by M. I. Wilbert, on "Doses in the U.S.P.," and one by Allen Shryock, on "Our New Pharmacopœia and the Metric System of Weights and Measures," which latter was read in the absence of the author by Charles H. LaWall.

In commenting on the first paper Dr. Lowe said that the comparison which Mr. Wilbert made of the doses in the first revision of the Pharmacopœia and those in the eighth decennial revision showed that there is a tendency to reduce the size of doses. The speaker then called attention to some of the doses in the new Pharmacopœia which he considered to be rather peculiar. As examples he mentioned the dose of honey which is given as 1 fl. dr., while the dose of tamarinds, a more active medicine, is 4 dr.; another example was codeine, the dose for the alkaloid and its salts being the same. He was glad that average doses were given, as there would have been no advantage in giving minimum doses only, and if maximum doses had been given this would have tended to hamper the physician.

Otto Kraus related an instance showing that some physicians have already begun to write their prescriptions in accordance with the new Pharmacopœia, but said that the majority of them have not yet taken cognizance of the important changes which have been made.

Dr. C. A. Weidemann did not agree with the latter statement, and said that physicians are aware of this feature of the work.

Professor Sadtler said that owing to the large number of circulars which had been distributed giving notice of the changes in strength of pharmacopœial preparations, it hardly seemed possible for any physician to be ignorant of them. He then alluded to the personnel of the Sub-committee on Doses, and said it was composed of both physicians and pharmacists, but that the subject was left mostly to the physicians, who, he said, were eminent in their calling, and no doubt had some good reasons for the selection of the doses as given

in the Pharmacopœia. He was of opinion that the greater purity of the medicinal products on the market at the present time might account for the smaller doses now administered of certain medicines.

Mr. Wilbert also remarked on the latter point, and said that previous to the organization of the American Pharmaceutical Association two grades of medicines were brought into this country—one for the Western country and one for the seaboard. The drugs for the Western country were much inferior in quality, and as an illustration of this he mentioned that chalk was substituted for calomel, which of course necessitated a large dose of the preparation.

E. M. Boring was inclined to favor the method adopted in the German Pharmacopœia of giving the maximum and minimum quantities given in twenty-four hours.

E. R. Gatchel referred to the large doses of certain drugs that were prescribed only thirty years ago. He recalled an instance in which 2 ounces of cinchona were prescribed in a dozen powders.

With regard to the use of the metric system of weights and measures Professor Lowe said that it was not only much more convenient in manufacturing, but that it is much better to use the metric quantities than to attempt to convert them into equivalents of the ordinary system.

Several of the retail druggists present contended that nearly all druggists are provided with the weights and measures of the metric system.

Professor Sadtler said that in all or nearly all the colleges of pharmacy the metric system is taught and that when the student graduates he is master of it. But when he goes into the store he comes in contact with ordinary prescriptions. He said that being neither a physician nor pharmacist he was in a position to view the matter more or less impartially, and he was convinced that if physicians would write their prescriptions in the metric system, druggists would compound them accordingly.

Mr. Gatchel spoke of the small percentage of physicians who use the metric system in prescription writing.

Mr. Wilbert contended that if pharmacists would follow the metric system physicians would be more inclined to use it. He then spoke of the advantages of the system in assay work, and said that the calculations can be made both rapidly and accurately. In concluding

his remarks he urged the use of metric weights and measures both in the making and the testing of pharmacopœial preparations.

In speaking of the tests and assay processes of the new Pharmacopœia, Mr. Boring referred to the claim which has been made that the work is more suited to the needs of the manufacturer than of the retail pharmacist.

Henry Blair said that in his experience he had found the metric system to be a source of confusion and that its use does not do away with the use of fractional parts. He said that he frequently had customers of foreign birth who would ask for ½ or ¼ "kilo," but never for gramme quantities. He had furthermore found it impracticable to order goods in metric quantities, only a few houses putting up their goods in this way.

Charles H. LaWall, Instructor in Pharmacy, said that the students under him were thoroughly drilled in the use of the metric system, but that not being required to use it in practice, they regard their knowledge of it as more or less superfluous and of no practical use.

Copies of the first Pharmacopœia published in the United States, and reprinted from the AMERICAN JOURNAL OF PHARMACY, July, 1884, were distributed among the members. The work was published in Lititz, Lancaster County, Pa., March 12, 1778. Mr. Wilbert said that the author, Dr. Wm. Brown, had charge of the hospital at Lititz during the Revolution, and that he was an interesting character, being distinguished as the physician of both Washington and Jefferson.

FLORENCE YAPLE, *Secretary pro tem.*

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the members of the Philadelphia College of Pharmacy was held September 25, 1905, in the Library, at 4 o'clock, the President, Howard B. French, presiding. Twenty members were present. The minutes of the quarterly meeting, held June 26th, were read and approved. The minutes of the Board of Trustees for April 25th, May 2d, 11th, 25th and June 26th were read by the Registrar, Jacob S. Beetem, and approved.

W. A. Rumsey, for the Committee on Nominations, presented the list of proposed nominations for Trustees, which was ordered entered on the minutes. Prof. Henry Kraemer, chairman of the delegates to the American Pharmaceutical Association, read a report. Accompanying the report was an account of the Alumni Reunion, held at Atlantic City. Of those members in attendance,

about 75 were present, and several hours were delightfully spent together. Addresses were made by a number of members and invited guests. Among them were N. H. Martin, of England; S. A. D. Sheppard, Prof. C. Lewis Diehl, Prof. H. M. Whelpley, Dr. A. E. Ebert, Prof. H. V. Arny, Prof. E. G. Eberle, P. C. Candidus, Frank G. Ryan, S. W. Fairchild, Prof. C. S. N. Hallberg, and J. L. Lemberger.

Prof. C. Lewis Diehl presented his lecture notes, taken while a student at the College in 1860. A cablegram, "Hearty Greetings," from H. S. Wellcome and F. B. Power, of London, was also received.

In connection with the report Professor Kraemer presented a scrap book containing invitation cards, letters of acknowledgment and other matters pertaining to the reunion.

The resignation of F. C. Handwork, an associate member, was accepted.

The death of Henry Cramer, a member of the College since 1866, was announced as having occurred July 28, 1905.

A letter was received from Mrs. Marie Hoffmann, widow of Dr. Frederick Hoffmann, an honorary member of the College, acknowledging the receipt of the resolutions of sympathy which had been voted at the meeting of the College held March 27, 1905.

Mr. Thomas S. Wiegand announced that he would give to the College the notes of lectures taken while he was a student, and also those of another old graduate.

Professor Kraemer, in noting the gifts of Prof. C. Lewis Diehl and Mr. Wiegand, said there should be exhibitions from time to time of such articles of historical value as were donated to the College, and efforts made to encourage similar donations from those interested in presenting them, as their value would increase as time goes on.

Harry L. Stiles, Joseph W. England and George M. Beringer were re-elected to membership on the Board of Trustees for the ensuing three years.

The president reappointed Henry Kraemer, W. A. Rumsey, H. L. Stiles, James T. Shinn and C. A. Weidemann to the Committee on Membership.

ABSTRACTS FROM MINUTES OF THE BOARD OF TRUSTEES.

April 25th.—Owing to new pharmacy laws going into effect in several of the States, the Committee on Instruction deemed it wise to propose new requirements for entrance examinations. The report submitted elicited considerable discussion and was laid over for one month.

May 2d.—The Committee on Instruction submitted their annual report, which embraced abstracts from the annual reports of the Faculty received by the Committee, which in part were as follows:

Department of Theory and Practice of Pharmacy.—New features have been introduced; the lectures somewhat modified by the necessity of introducing facts in connection with the revision of the United States Pharmacopœia.

Course in Commercial Training has been improved and extended.

Course in the Dispensing Laboratory has been greatly appreciated.

Department of Chemistry.—The first-year work has been carried on very satisfactorily. The instruction covered chemical physics and non-metallic elements.

The second-year instruction covered the acids from the non-metallic elements, metallic salts, metals, etc.

In the Senior Class the subject of organic chemistry, its application to pharmacy, has been extensively treated. The supplementary course of two lectures per week just completed covered the following subjects: Technical Organic Analysis and Food Adulterations.

Department of Analytical Chemistry.—Every available desk was utilized, and it may be necessary in the near future to arrange for more sections. The extension of the course for the third-year students enabled the professor to enlarge upon the work given in previous years, and included the following: Gravimetric, Volumetric, Gasometric and Urine Analyses, Fehling's Solution, Tests for Elements and Organic Compounds, Alkaloidal Assays, Oils, Fats, Waxes, Food Adulterations and Preservatives.

Department of Botany and Pharmacognosy.—The professor directs attention to the need of more time in the first and second year, in order to give the students a firmer grasp on this part of the work. For some years past he has been making a collection of the different commercial varieties of each drug, and believes it is one of the best and largest collections of this kind to be found.

Department of Materia Medica and Pharmacology.—Results of the work in the first year have been quite satisfactory. The extension of the third-year course has made it possible to rearrange the second-year course, which had been previously overcrowded. In the third-year class the results shown by the examination were that the percentage of those obtaining a grade of very satisfactory greatly exceeded all previous records.

May 11th.—The degree of Master in Pharmacy, *Honoris Causa*, was conferred upon Prof. Frank X. Moerk, and also upon Prof. Chas. H. LaWall—in course.

May 25th.—The report of the Committee on Instruction relating to entrance examinations was further discussed, and after a number of alterations had been proposed, were considered *seriatim* and adopted.

Professor LaWall was appointed Instructor in Algebra, this position being made necessary by the new entrance requirements.

The appointment of an Instructor in Latin was referred to the Committee on Instruction with power to act.

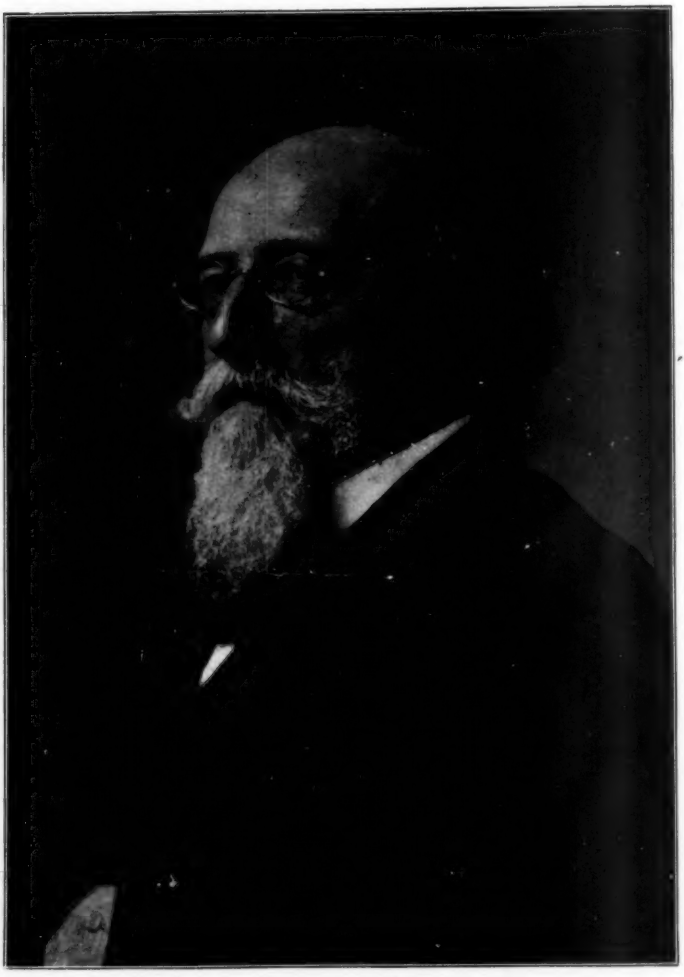
June 6th.—A vote of thanks was tendered to Professor Henry Leffmann, for his donation of two volumes of "Hermetic Alchemical Writings of Paracelsus," translated by A. B. Waite.

Prof. Wallace S. Truesdell was elected Professor in Latin.

Ambrose Hunsberger was elected to active membership.

Amendments to By-Laws were proposed, made necessary by changes in the curriculum.

C. A. WEIDEMANN, M.D.,
Recording Secretary.



ALBERT HILGER,
1839–1905.